



FIBERLYTE®

CARBON FIBER

ANILOX ROLLS

ARE NOW

A REALITY

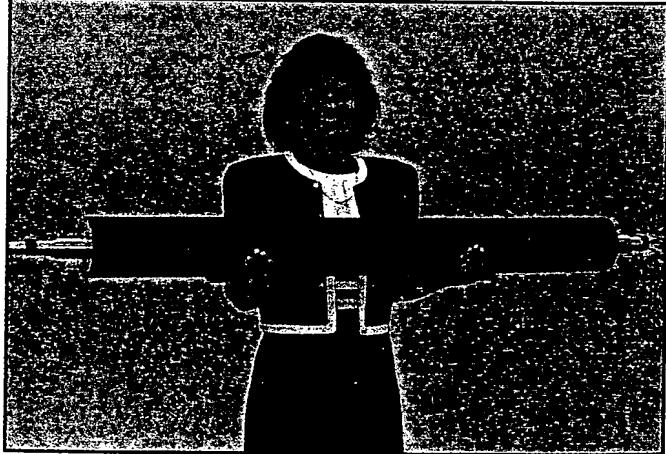
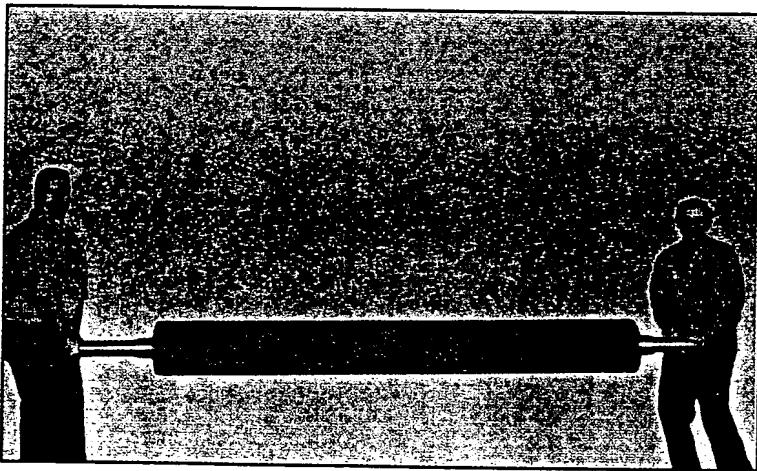


PAMARCO
CREATING THE BEST IMPRESSION

- Weighs approximately one-tenth the weight of a traditional steel roll.
- Reduces press downtime to change rolls.
- Less chance of crew injury during roll changes because of significantly reduced roll weight.
- Allows the use of standard bearings.
- Greater tensile strength with excellent corrosion resistance.
- Improved print quality - virtually zero deflection.
- Less abrasion on doctor blade - longer doctor blade life.

ANILOX ROLL WEIGHTS

Anilox Roll Size	Traditional Steel Roll	Pamarco Fiberlyte®	Weight Reduction
Narrow Web roller 3" OD x 18" Face	77 lbs.	7 lbs.	90.9%
Wide web roller 5.500" OD x 50" Face	519 lbs.	49 lbs.	90.6%
Corrugated roll 10.000" OD x 98" Face	1,460 lbs.	115 lbs.	92.1%



THE TESTING PROCESS

The first Fiberlyte® rolls were invented by Pamarco in 1994. Since then, more than four hundred rolls have been tested in various segments of the flexographic industry without a single failure. All of these rolls not only have produced excellent printing qualities, several plants have reported quality improvements. The next step in validating the Fiberlyte® roll was to supply an entire press with carbon fiber rolls and to verify some of the materials' other advantages.

In July, 1997, St. Laurent Paperboard in Latta, SC, made flexographic history. They purchased a six color Bobst Flexo 200 press supplied with twelve Fiberlyte® rolls ranging from 220 line, 10.0 volume to 600 line, 2.5 volume. A few months after the press was installed, Craig Irving, St. Laurent's Consumer Plant Superintendent, reported that the press was printing "great". Bobst technicians had recommended that the doctor blade be changed every 40 hours due to wear. St. Laurent, in actuality, was getting three times

that life from their doctor blade with their white carbon steel blades (.006 thickness). Pamarco attributes this benefit to the greatly reduced deflection property of carbon fiber. It is also very likely that reduced doctor blade wear is indicative of another benefit of lower deflection, which is increased roll life. The doctor blade system requires less pressure to get an even ink film thickness across the entire face length. The decrease in pressure results in less abrasion between the doctor blade and the anilox roll and, therefore, longer life.

The dramatic increase in blade life resulting from carbon fiber's deflection properties caused Pamarco to investigate what print characteristics might be affected by carbon fiber's physical properties. St. Laurent agreed to allow Pamarco to conduct a test at their plant in January, 1998, to compare a Fiberlyte® roll and a steel core roll engraved to identical specification. The following variables were used:

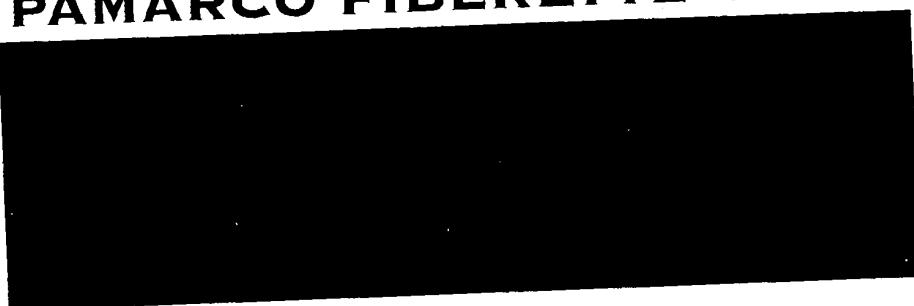
- Using WYKO cell volume measurement equipment for the highest possible accuracy, Pamarco manufactured a steel core roll to match one of St. Laurent's 600 line 2.5 volume Fiberlyte® rolls.
- City Stamp Works, Ludlow, Massachusetts, donated Polyfibron's .155 non-capped liquid photo polymer plate on 30pt. PVC carrier sheet with a 35 durometer. Foam backing was not used for mounting in an attempt to create conditions that would maximize "plate bounce" (anilox roll bounce caused by plate design). The print surface extended across the entire face length to determine if a decrease in deflection would produce any print advantages on the ends of the roll. It included a 100 line screen band with 50% dot area to check dot gain.
- A single color ink was sufficient for this particular test. Environmental Ink and Coating of Morganton, NC, donated black ink. Viscosity would be 15 seconds using a number 3 Zahn cup with pH at 9.3.
- Saint Laurent provided CIP bleached white E-flute board.

DRAMATIC TEST RESULTS

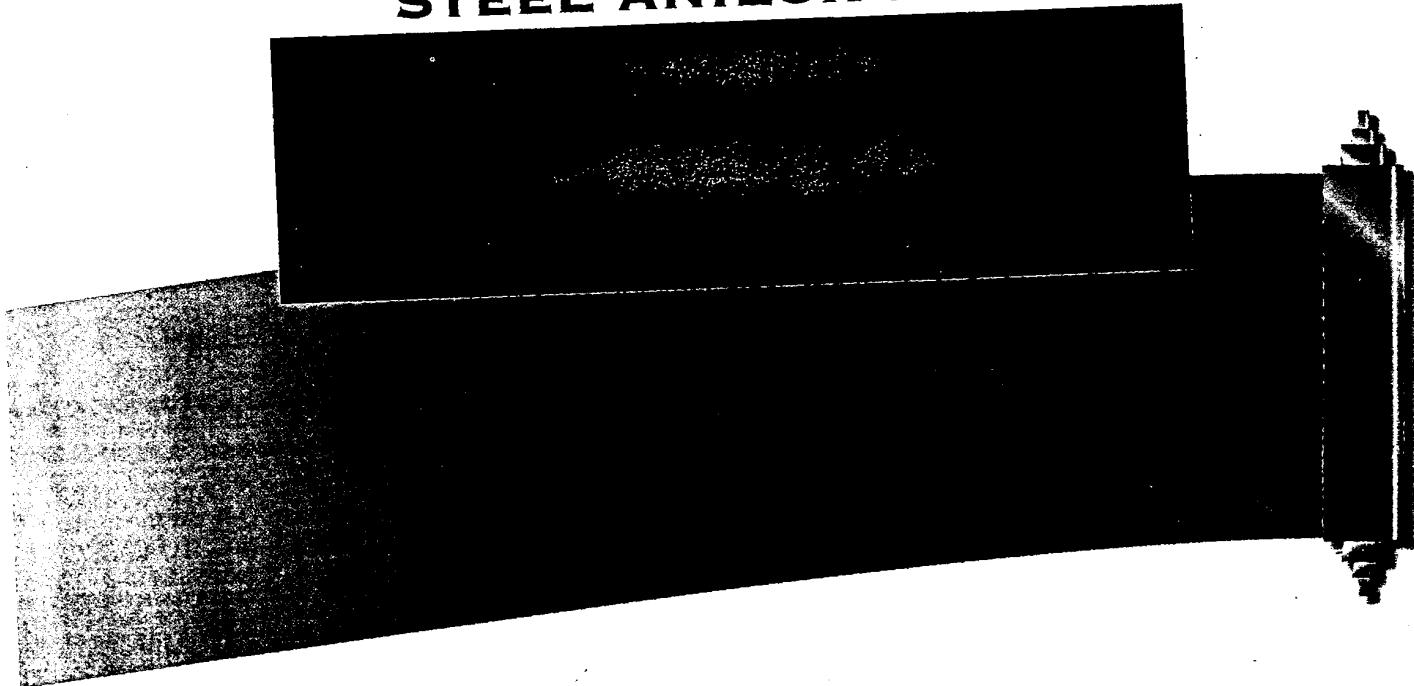
The most dramatic aspect of the test occurred when press speed reached 3000 SPH. The steel roll was affected by the plate design, creating significant bounce. The testers were unable to maintain the solid image in the center with the steel roll. The Fiberlyte® roll, however, continued to produce a solid image over the entire length of the plate.

This dynamic improvement can most likely be attributed to carbon fiber being twice as strong as steel with less than one-tenth the deflection. The most exciting potential benefit of this feature is improved print quality in jumbo presses. Anilox rolls in these presses have deflection properties of .005 and greater. It is extremely difficult, if not impossible, to do quality printing using these traditional steel rolls on jumbo presses.

PAMARCO FIBERLYTE® ROLL



STEEL ANILOX ROLL



CARBON FIBER ROLLS

Graphite carbon fiber, developed by the aerospace industry for making stronger and lighter parts, is now being used by Pamarco, Inc. to build it's Fiberlyte® laser engraved rolls.

Conventional steel tubing is replaced by a core of carbon fiber that is twice as strong as steel with approximately one-tenth the weight for a typical roll. Reducing the weight of an anilox roll can reduce press downtime for roll changes and allows standard bearings to be used rather than heavy duty bearings necessitated by heavy steel anilox rolls. The rolls are ceramic-coated with chrome oxide, ground with a diamond-embedded stone, polished and laser engraved to the customer's specification.

FIBERLYTE® STATISTICS

ROLL SIZE: 10.330" OD X 111.00" FACE

Property	Steel	Carbon Fiber
Weight (#)	1,310	85
Strength (PSI x 10 ⁶)	30.0	59.0
Inertia	418.31	145.80
Dynamic Balance	Required	Not Required
Deflection @ "0" Load - (In. x 10 ⁻⁴)	18.6	1.7
Deflection @ Doctor Blade Load - (In. x 10 ⁻⁴)	19.0	2.0
Deflection @ Max. Load - (In. x 10 ⁻⁴)	27.0	13.0
Corrosion Resistance	Poor	Excellent
Reprocessability	2-3 Times	3-5 Times

BENEFITS:

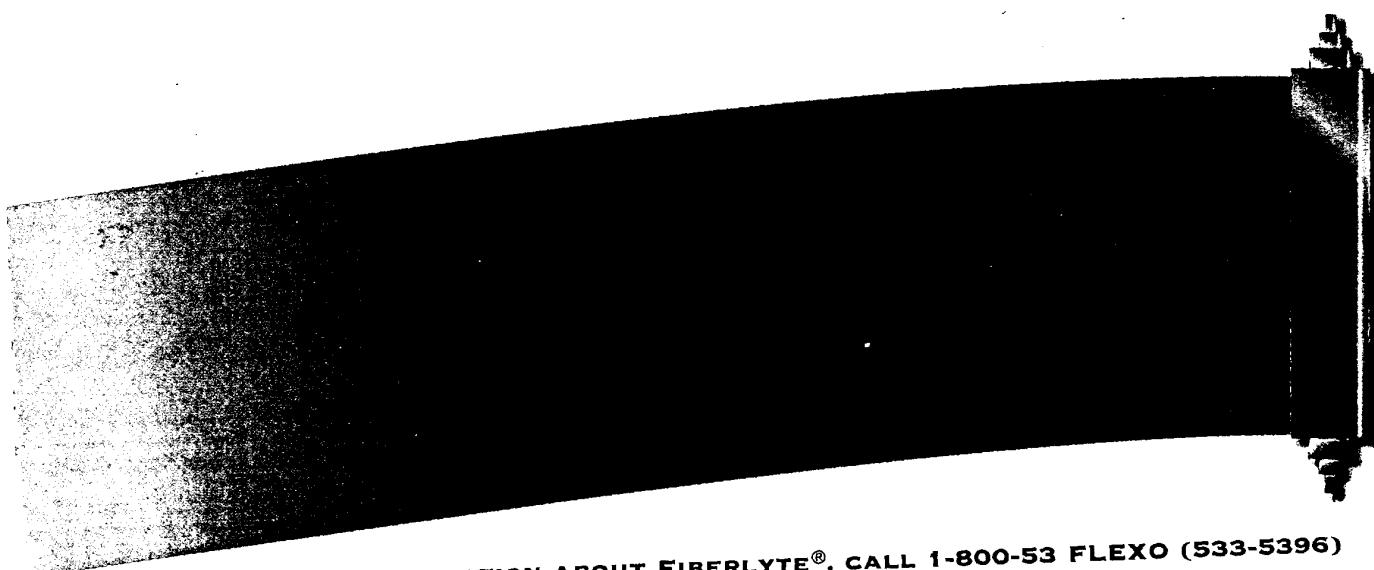
FOR LARGE ROLLS:

- Minimization of downtime during a required anilox roll change.
- Ability to operate at lower power consumption.
- Operation at higher overall press speeds.
- Substantial decrease in waste.
- Easy handling.
- Less damage.
- Fewer injuries.

MOMENT - Means "movement"

INERTIA - The tendency of matter to remain at rest until affected by an outside force.

MODULUS - Modulus of elasticity - The ability to bend with a load and straighten up.



FOR ADDITIONAL INFORMATION ABOUT FIBERLYTE®, CALL 1-800-53 FLEXO (533-5396)

 **PAMARCO**
CREATING THE BEST IMPRESSION